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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/039,036	01/04/2002	Nicholas P. Wilt	MSFT-0742/177739.1	2352

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EXAMINER	
ALI, SYED J	

ART UNIT	PAPER NUMBER
2195	

DATE MAILED: 07/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/039,036	WILT ET AL.	
	Examiner	Art Unit	
	Syed J. Ali	2195	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-74* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-74* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *04 January 2002* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/4/02; 7/4/03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-74 are pending in this application.

Drawings

2. The drawings are objected to because Figure 5 contains shaded portions that are difficult to read after scanning. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claims 1-74 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

5. As per claims 15, 41, and 66, it is unclear how a "runtime" is to be compiled. "Runtime" is commonly known as the period of time when a program is being executed. For a component to be compiled, it must be some sort of software module, method, or program, as opposed to a period of time.

6. As per claims 1-74, it is unclear how a "command buffer" is "submitted". A command buffer is typically a storage area, while the claim treats it as an application or a task. The dependent claims, e.g. claims 2-4, also refer to command buffers being transmitted, executed, etc. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). Applicant treats buffers in a way that is inconsistent with the accepted meaning in the art; command buffers may store commands for execution, but buffers themselves are not subject to execution.

7. As per claims 24-26 and 50-51, the claims are phrased in such a way as to present what should be independent claims as dependent claims. Any claim which is in dependent form but

which is so worded that it, in fact, is not a proper dependent claim, as for example it does not include every limitation of the claim on which it depends, will be required to be canceled as not being a proper dependent claim; and cancellation of any claim depending on such a dependent claim will be similarly required. The applicant may thereupon amend the claims to place them in proper dependent form, or may redraft them as independent claims, upon payment of any necessary additional fee. MPEP §607.

Claim Rejections - 35 USC § 101

8. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

9. **Claims 24-74 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.**

10. As per claims 24-27 and 52, the claimed "computer readable medium", "modulated data signal", and "computing device" are non-statutory for at least the reason that they are not tangibly embodied in a manner as to be executable. The claims are not tangibly embodied, as they fail to include any recited hardware. For example, "computer readable media" is defined at page 15, lines 2-21 of Applicant's specification as including "communication media" that is merely an electrical signal. This type of claim is not tangibly embodied and is therefore non-statutory.

11. As per claims 28-49 and 52-74, they are rejected for at least the same reasons as their parent claims, as they fail to present any limitations that resolve the deficiencies of the claims from which they depend.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

13. **Claims 1-13, 16-39, 42-64, and 67-74 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson et al. (USPN 5,577,250) (hereinafter Anderson) in view of Duruoz et al. (USPN 6,487,642) (hereinafter Duruoz).**

14. As per claim 1, Anderson teaches the invention as claimed, including a method for controlling the computational resources of at least one coprocessor in a host computing system having a host processor (col. 1 lines 11-14), comprising:

controlling the at least one coprocessor of the computing system with tasks submitted to the at least one coprocessor by a host processor of the host computing system (col. 6 lines 64-67; col. 7 lines 6-12);

transmitting, by the at least one coprocessor, data back to the host computing system in response to commands (col. 10 lines 6-17); and

scheduling the transmission of the tasks included in the host computing system (col. 7 lines 36-41; col. 10 lines 6-17),

wherein the computational resources of the at least one coprocessor are simultaneously available to a plurality of applications instantiated on the host computing system (col. 5 lines 33-38).

15. Duruoz teaches the invention as claimed, including using a managing object to submit tasks to command buffers associated with the coprocessor (Fig. 3; col. 2 lines 32-46).

16. It would have been obvious to one of ordinary skill in the art to combine Anderson and Duruoz since buffering commands instead of requiring immediate execution allows the host processor to continue in other tasks without waiting for the coprocessor to complete its commands. This allows other tasks with hard deadlines to be completed on time, creating a pipelined system of processing that allows more tasks to be serviced in the same period of time.

17. As per claim 2, Duruoz teaches the invention as claimed, including a method according to claim 1, wherein said scheduling includes scheduling the transmission of the command buffers by an operating system included in the host computing system (col. 6 line 67 - col. 7 line 4).

18. As per claim 3, Duruoz teaches the invention as claimed, including a method according to claim 1, wherein the managing object is notified by a coprocessor that a command buffer has finished execution (col. 5 lines 57-63).

19. As per claim 4, Duruoz teaches the invention as claimed, including a method according to claim 1, further including queuing a new command buffer for a coprocessor to begin executing when a current command buffer is finished (Fig. 3; col. 2 lines 32-46).

20. As per claim 5, Duruoz teaches the invention as claimed, including a method according to claim 1, further including specifying a coprocessor context switch when a command buffer is submitted (col. 7 line 66 - col. 8 line 13).

21. As per claim 6, Duruoz teaches the invention as claimed, including a method according to claim 1, wherein said managing object allows a plurality of types of coprocessor context (col. 8 line 64 - col. 9 line 8).

22. As per claim 7, Duruoz teaches the invention as claimed, including a method according to claim 6, further including affiliating coprocessor context with a host processor thread context (col. 8 lines 56-63).

23. As per claim 8, Duruoz teaches the invention as claimed, including a method according to claim 7, further including integrating by the managing object the context switching code for the host processor and the coprocessor (col. 8 line 56 - col. 9 line 8).

24. As per claim 9, Duruoz teaches the invention as claimed, including a method according to claim 1, further including notifying the managing object by a coprocessor that a command buffer is invalid (col. 8 lines 28-34).

25. As per claim 10, Duruoz teaches the invention as claimed, including a method according to claim 1, further including resetting a coprocessor of the at least one coprocessor if the coprocessor is unresponsive for a predetermined period of time (col. 20 lines 60-66).

26. As per claim 11, Duruoz teaches the invention as claimed, including a method according to claim 1, further including translating by a hardware-specific driver object, via an application programming interface of the managing object, instructions of a command buffer into hardware-specific instructions during composition of the command buffer (col. 6 line 16 - col. 7 line 17).

27. As per claim 12, Duruoz teaches the invention as claimed, including a method according to claim 11, wherein said translating runs in user mode (col. 6 line 16 - col. 7 line 17).

28. As per claim 13, Duruoz teaches the invention as claimed, including a method according to claim 12, further including allocating a guard page at the end of the command buffer to facilitate efficient detection of buffer overflow (Fig. 3; col. 2 lines 32-46, wherein management of overflow is a well-known technique of buffering to prevent data from being dropped).

29. As per claim 16, Anderson teaches the invention as claimed, including a method according to claim 12, wherein said driver object coordinates with a corresponding kernel mode driver object to edit the command buffer before submission to hardware (col. 7 lines 6-18).

30. As per claim 17, Anderson teaches the invention as claimed, including a method according to claim 1, wherein the at least one coprocessor includes at least one graphics processing unit (col. 1 lines 18-20).

31. As per claim 18, Anderson teaches the invention as claimed, including a method according to claim 1, further including preempting by the at least one coprocessor upon the occurrence of an external event (col. 7 lines 41-55).

32. As per claim 19, Anderson teaches the invention as claimed, including a method according to claim 18, wherein the external event is the operating system making a call to a corresponding kernel mode driver object to preempt the at least one coprocessor (col. 7 lines 41-55).

33. As per claim 20, Duruoz teaches the invention as claimed, including a method according to claim 18, wherein the host processor is interrupted to coordinate scheduling of processing time (col. 6 line 66 - col. 7 line 4).

34. As per claim 21, Duruoz teaches the invention as claimed, including a method according to claim 1, further including virtualizing by the managing object at least one resource of the at least one coprocessor during editing of the control data streams of a command buffer before submission to a coprocessor (col. 2 lines 3-13, 32-46).

35. As per claim 22, Duruoz teaches the invention as claimed, including a method according to claim 21, wherein the at least one resource virtualized by the managing object of the at least one coprocessor is a memory (Fig. 12; col. 8 line 56 - col. 9 line 8).

36. As per claim 23, Duruoz teaches the invention as claimed, including a method according to claim 1, wherein the managing object uses thread synchronization primitives to coordinate the construction, scheduling, and submission of coprocessor command buffers (col. 6 line 66 - col. 7 line 17; col. 8 lines 24-36).

37. As per claim 24, Anderson teaches the invention as claimed, including a computer readable medium having stored thereon a plurality of computer-executable instructions for performing the method of claim 1 (Fig. 1).

38. As per claim 25, Anderson teaches the invention as claimed, including a modulated data signal carrying computer executable instructions for performing the method of claim 1 (Fig. 1).

39. As per claim 26, Anderson teaches the invention as claimed, including a computing device comprising means for performing the method of claim 1 (Fig. 1).

40. As per claim 27-39 and 42-49, Anderson teaches the invention as claimed, including at least one computer readable medium having stored thereon a plurality of computer-executable modules for performing the method of claims 1-13 and 16-23, respectively (Fig. 1).

41. As per claim 52-64 and 67-74, Anderson teaches the invention as claimed, including a computing device for performing the method of claims 1-13 and 16-23, respectively (Fig. 1).

42. **Claims 14-15, 40-41, and 65-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Anderson in view of Duruoz in view of Hendler et al. (USPN 6,473,777) (hereinafter Hendler).**

43. As per claim 14, Hendler teaches the invention as claimed, including a method according to claim 12, wherein the user mode driver and corresponding runtime component are provided in intermediate language form and the method further includes just in time (JIT) compiling on a client device having the user mode driver and runtime component (col. 3 lines 29-63).

44. It would have been obvious to one of ordinary skill in the art to combine Anderson and Duruoz with Hendler since the offloading of certain processing to a coprocessor allows the host to continue performing other tasks, while allowing more computationally intensive tasks to be handled by a dedicated processor. Just-in-time compiling incurs a great deal of overhead and could bog a system down. By dedicating a coprocessor to perform such a function, the system as a whole can operate more efficiently.

45. As per claim 15, Hendler teaches the invention as claimed, including a method according to claim 14, wherein the application is also provided in intermediate language form and said JIT compiling includes JIT compiling the application on the client device with the user mode driver and runtime (col. 3 lines 29-63).

46. As per claim 40-41, Anderson teaches the invention as claimed, including at least one computer readable medium having stored thereon a plurality of computer-executable modules for performing the method of claims 14-15, respectively (Fig. 1).

47. As per claim 65-66, Anderson teaches the invention as claimed, including a computing device for performing the method of claims 14-15, respectively (Fig. 1).

Conclusion

48. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Syed J. Ali whose telephone number is (571) 272-3769. The examiner can normally be reached on Mon-Fri 8-5:30, 2nd Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Meng-Ai T. An can be reached on (571) 272-3756. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Syed Ali
July 7, 2005

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